College & Career Awareness

Program Area(s): Information Technology

Lesson Plan Title: Over and Over
Code.org: The Farmer. While doing loops—Farmer stage 9—while doing loops by completing an online tutorial at code.org.

Estimated Time: 50 minutes

Primary CTE Pathway(s) Explored: Programming/Software Development

Intended Learning Outcome(s):

- Become acquainted with a wide range of occupations, CTE Pathways, career trends and emerging careers.
- Expand career awareness through participation in Work-Based Learning experiences.
- Identify career and postsecondary education options through investigation of high school to college and career pathways.
- Consider and explore nontraditional career opportunities.

College and Career Awareness Standard, Objective(s):
Standard 7, Objective 2

Cross Curriculum Integration:

- **21st Century or Interpersonal Soft Skills—critical thinking, collaboration, communication, creativity:**
- **Engineering:**
- **Math:**
- **Science:**
- **Technology:**

Career Opportunities in the CTE Pathway(s): Software developer, computer programmer, computer systems analysts, computer and information systems manager, Web developer, software quality assurance, user interface designer, software entrepreneur

Nontraditional Career Opportunities: Software developer, computer programmer, computer systems analysts, computer and information systems manager, Web developer, software quality assurance, user interface designer, software entrepreneur

STEM Specific Career Opportunities: Software developer, computer programmer, computer systems analysts, computer and information systems manager, Web developer

Methods (Approach to Teaching and Learning):

- Direct Instruction and Demonstration
- Activity/Inquiry/Practice Centered Instruction

Materials Needed:

- Computer or tablet with Internet connection

Vocabulary:

- Career – a field of work.
- Coding – writing statements in a computer program.
- Computer science –- studying how computers work and think.
- Condition – a statement that can be either true or false and is used in while do loops and if statements.
- Conditional – part of a statement that evaluates as true or false.
- Debug – to fix mistakes in a computer program.
- Else – part of a decision statement that runs if the condition is false.
- Function – a command that performs a series of actions.
- If do –- a decision statement that can use to decide whether to perform an action or not based on the condition being evaluated as true.
- If-block – a statement that lets a decision make in a program.
- Loop – to repeat a set of statements over and over.
- Problem solving – the process of figuring out a solution to a problem.
- Repeat times – a code block that loops for a given number of times.
- Repeat until – a code block that loops until a condition is met.
- Sequence – to do one statement or command one after another.
- While do loop – a loop that continues as long a condition is met (true).
- Workspace – the place where blocks are place to run.

See Handout 7.2.1 Coding Words.docx

Prior Knowledge Required by Students:

- Basic computer skills
- Web navigation

Instructional Procedures:

Background

In this lesson students will be introduced to Code Studio and their intro course. All code.org activities are designed with the following characteristics:

- High quality.
- Self-directed, don't require instruction.
- Designed for beginners.
- Designed as a 1 hour activity.
- Work across many OS/device platforms, including mobile and tablets.
- Work across multiple languages.
- Promote learning by all demographic groups (especially under-represented groups).

Because the activities are designed to be self-directed. A teacher does not need a lot of computer science background to get started. As students' progress through the puzzles on Stage 2 (Level 2) "The Maze" they are shown a video with a person who "codes" for a living and who introduces the concept or skill needed for the next 3 or 4 puzzles.

As a teacher you can setup a class for your students and have them enroll if you would like. This will allow you to monitor their progress. You can set yourself up as a teacher and then setup accounts for your students. When you do this you can print login cards for all of your students. Code.org gives prizes for teachers who have a certain number of students complete all the "stages." There are a number of "stages" which are unplugged which mean they are done

without a computer. In these lessons we will be concentrating on the puzzles that are done on the computer.

Introduction

In this lesson students will need access to a computer with Internet access. The “Intro to Computer Science” course introduces basic computer science concepts. In “Stage 2: The Maze” students use puzzles to introduce the computer science concepts of 1) sequence, 2) loops, and 3) if block (decisions). All computer programs can be written using these three basic structures.

1. Sequence — doing a set of commands in order, one right after another.
2. Loops — repeating a set of commands over and over. Two different loop blocks are introduced. 1) Repeat—number of times, and 2) Repeat until—condition is met. We do repetitions each day: walking, climbing stairs, eating until plate is clean, etc.
3. If block — also known as a decision. The if block is usually structured as if some condition which is true, then do the following action or command. The if block can also have an "else" section that if the condition is false, then the commands following the else statement are run. See structures below:

    If condition which can be either true or false
    > actions or statements if true
    > if the condition is false then no statements are run

Coding Careers

In this lesson student are introduced to several people who are coders or have started companies coding in the videos. The “Coding Words” handout has a section for the students to identify five of the coders and what career they have or the business they started.

- Paola Mejia – A Microsoft software developer and engineer.
- Mark Zuckerberg – Founder of Facebook
- Makinde Adeagbo – Pinterest software developer and engineer.

Computer science, coding, is used in many different careers by both men and women.

Paired Programming

If you do not have enough computing devices this activity can be started with showing the puzzles on a projector and asking the students for help to solve the puzzles. Paired programming can also be used. In paired programming two students work together using the following rules:

- One student drives. Uses the keyboard and mouse.
- One student gives directions.
- Students switch roles back and forth.

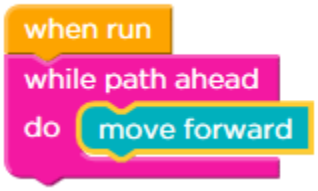
Videos and Puzzles

[Stage 9 – The Farmer]

- **Puzzle 1: Video** – Paola Mejia, a Microsoft software developer and engineer introduces the farmer. He fills holes with his shovel or remove piles with his shovel. The "remove 1" function is introduced.
- **Puzzle 2: "fill" function** is introduced.
- **Puzzle 3: Video** –Mark Zuckerberg the founder of Facebook reintroduces loops to make removing piles and filling holes easier. A pile of dirt with 10 shovelfuls is removed.

- **Puzzle 4: Remove piles.** A loop is used to remove four piles of dirt.
- **Puzzle 5: Video** – Makinde Adeagbo, a Pinterest software developer and engineer introduces "while do loops".

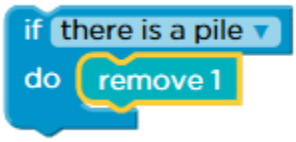
A repeat loop is nested in a while do loop.



Question: What is the condition in the "while do loop"?
Answer: path ahead

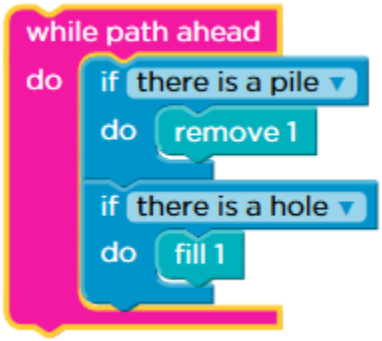
- **Puzzle 6: While do loop.** The while do loop is shown with a condition that can be changed.

- **Puzzle 7: Fill Deep Hole** using the “while do loop”.
- **Puzzle 8: While path ahead do loop.**
- **Puzzle 9: While path ahead and while piles do loops** are used to level the field.
- **Puzzle 10: Video –** Bill Gates, the founder of Microsoft, introduces the "if" statement and tells how he created a Tic Tac Toe game.



Question: What decision or "if" statements do we use every day?

- **Puzzle 11: "if" statements nested in while loops.**



Question: What is the condition in the first "if" statement?
Answer: There is a pile
Question: What values can a condition in a “while do loop” or an “if do” statement have?
Answer: true or false (yes or no)

Additional Resources:

- Scratch
- Snap

Assessment(s):

- Students can complete all the puzzles in Stage 9: The Farmer. In the handout students also list careers for coders, coding structures, and reflect on what they would code and who it would benefit in society.
- Performance of skills.